DRAFT CARB REPORT

THE OZONE WEEKEND EFFECT IN CALIFORNIA

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April 2000

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ABSTRACT

GLOSSARY OF TERMS

carryover -- The term "carryover" is used in a couple of contexts in this report. In a general sense, "carryover" refers to the temporal persistence of ozone precursors or ozone from one day to the next day or days when these pollutants continue to participate in ozone photochemistry. "Carryover" in the atmosphere near ground level refers to pollutants that have been emitted into stable air at the earth's surface during the late evening and night-time hours and that persist into the morning. Thus, fresh emissions during the next day are added into already polluted air, causing ambient concentrations to be higher than otherwise. "Carryover aloft" refers to pollutants that were mixed, injected, advected into, or formed within, an air mass a few tens to hundreds of meters above ground level. If this polluted mass of air aloft is not dispersed, it can be incorporated into the surface layer of air during the day when sunlight increases vertical mixing of the atmosphere and the polluted air mass is mixed into the surface layer of air rich in fresh emissions of pollutants.

DOW (Day of Week) -- In most statistical analyses in this report, Sunday=1, Monday=2, …., Friday=6, and Saturday=7. In some instances, a mid-week mean to characterize the work week (e.g., Monday - Friday or Tuesday - Thursday) may be assigned the number "8".

GCV (Generalized Cross Validation) -- A method for choosing optimal parameter values in a statistical model. Frequently used to choose the smoothing parameter when fitting a spline curve. GCV is essentially a brute force approach, where a series of trial values are tested and the value which results in smallest estimated model error is selected.

GLM (Generalized Linear Model) -- A statistical procedure for judging whether differences between means of grouped observations are significant. For example, GLM could be used to test whether mean ozone concentrations from some dataset are significantly different on different days of the week.

LOD (limit of detection) -- The lower sensitivity threshold for a chemical analysis method. In common laboratory practice, when the concentration of a target compound is measured to be less than the LOD, it is judged to be too close to zero for the method to accurately distinguish from random background "noise". Therefore, the laboratory reports the concentration as "below LOD". LODs are method-specific; generally the more precise the analytical method, the lower the LOD.

NO_X (oxides of nitrogen) -- The NO_X data used in this report do not represent total reactive oxides of nitrogen (NO_Y) because the analyzers do not have converters very near the probe inlet. Thus, some "sticky" compounds may be lost in the sampling line before reaching the analyzer.

NO_2 (nitrogen dioxide) -- The NO_2 data used in this report are derived by subtracting nitric oxide (NO) concentrations from the NO_X concentrations. Thus, the NO_2 data represent not only nitrogen dioxide but also some unknown and variable but not total amounts of other oxidized nitrogen species such as nitric acid, particulate nitrates, and peroxyacetyl nitrates.

PAMS (Photochemical Assessment Monitoring Station) -- A monitoring site with enhanced monitoring (especially VOC species, but also NO_Y, meteorological conditions aloft) to better describe ozone formation processes.

POD (period of day) -- In this report, the day was divided into six 4-hour periods to facilitate data analyses of periods when different atmospheric processes are dominant: EAM (early morning; midnight - 4 a.m. PST), MAM (mid-morning; 4:00 - 8:00 a.m.), LAM (late morning; 8:00 a.m. - noon), EPM (early p.m. / afternoon; noon - 4:00 p.m.), MPM (mid-p.m. / evening; 4:00 - 8:00 p.m., and LPM (late p.m. / night; 8:00 - midnight).

Residual -- The discrepancy between a statistical model prediction and an actual observation used to estimate the model. For example, in a linear regression, the residuals are equal to the signed vertical distances between the data points and the regression line.

Spline -- A flexible regression technique which fits a curve to data. The smoothness of the curve is determined by the "smoothness parameter", which is chosen by the user. When the smoothness parameter is set to zero, the spline interpolates between successive data points (very jagged). As the smoothness parameter is increased, the spline fit gradually becomes smoother. When the smoothing parameter is very large, the spline approximates a straight line (the conventional least-squares linear regression fit).

Sunday Effect -- A term used to describe a subset of the Weekend Effect in which ozone concentrations tend to be higher on Sunday than on Saturday.

THC (total hydrocarbons)

TNMOC (total non-methane organic carbon)

VOC (volatile organic compounds)

Weekend Effect -- A term used to describe a tendency for ozone concentrations to be higher on the weekend than during the work week.

ACKNOWLEDGMENTS

This work was undertaken at the direction of the Board at its November 5, 1998 meeting. Staff thanks Boardmember Joseph C. Calhoun for his interest and support toward unraveling the causes of the Ozone Weekend Effect and the implications these factors may have with respect to the current ozone control strategy of reducing emissions of both ozone precursors. Staff also thanks Dr. James N. Pitts, Jr. for his valuable advice in the preparation of this comprehensive report. Staff acknowledges the leadership and direction provided to this project by Mr. Bart Croes and Mr. Bob Effa. The following staff members contributed to the completion of this report:

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Mike Franszwa - Chapter 5.4
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